MITSUBISHI
MITSUBISHI MATERIALS

TOOLS NEWS

2008.12 Update B036G

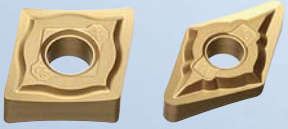
New insert grade for MS/GJ breaker

Special Breakers for Difficult-to-cut Materials

FJ/MJ/GJ/MS breaker

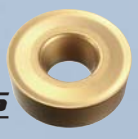
Excellent for highly accurate machining of heat-resistant and titanium alloy.

■CVD coated **US905**
a new CVD coated grade, for efficient high-speed turning of heat-resistant alloys.

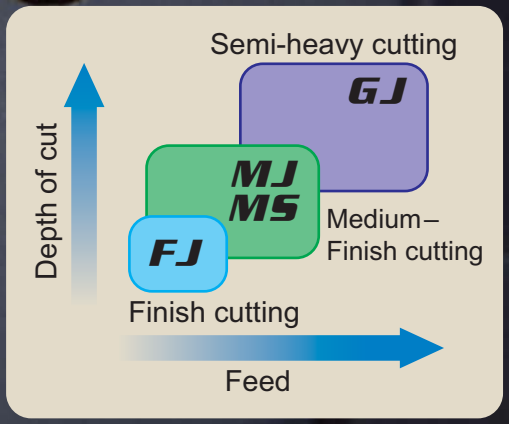


■An economical W type insert and a notch resistant, large corner radius type available.

■***RCMX*** round insert available as standard.



■CVD coated **US905** available for M class MS / GJ breaker.



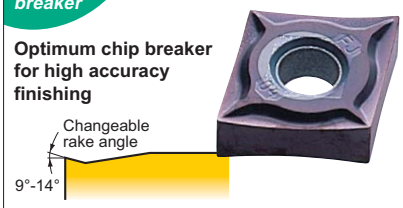
Special Breakers for Difficult-to-cut Materials

FJ/MJ/GJ/MS breaker
RCMX type insert

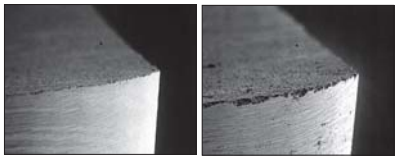
Features of FJ/MJ/MS/GJ breaker

FJ breaker — Finish cutting — G Class

Optimum chip breaker for high accuracy finishing



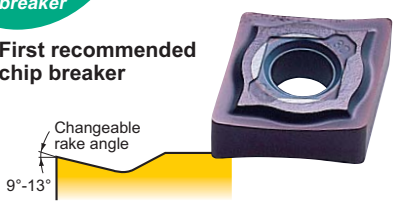
- Reduced heat generation with the use of a sharp cutting edge.
- Superior chip control at very small depths of cut with a special dot type chip breaker.



Cutting edge of FJ breaker (Extremely sharp cutting edge) | Cutting edge of a competitors breaker for difficult-to-cut materials.

MJ breaker — Medium–Finish cutting — M Class

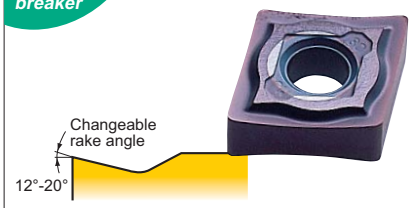
First recommended chip breaker



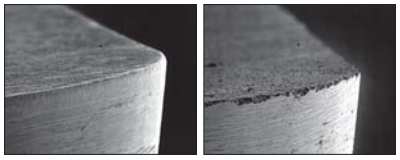
- M-class type with a smooth micro honing for highest sharpness.
- A curved edge design suitable for copy turning.
- A wide variety of corner radii, 0.4-1.6 available as standard.

Cutting edge of MJ breaker for class M (Extremely sharp cutting edge) | Cutting edge of a competitors breaker for class M

MJ breaker — Medium–Finish cutting — G Class

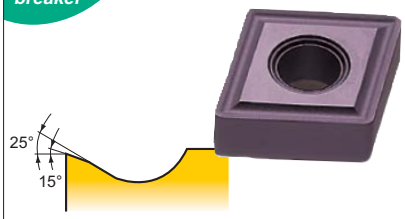


- G-class type with a smooth micro honing for the highest sharpness.
- A curved edge design suitable for copy turning.
- When high accuracy and precise insert positioning are needed, we recommend the use of G-class inserts.



Cutting edge of MJ breaker for class G (Extremely sharp cutting edge) | Cutting edge of a competitors breaker for difficult-to-cut materials.

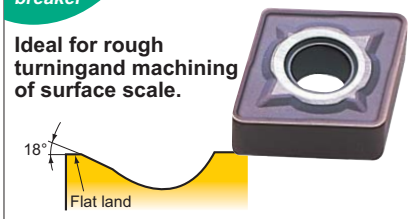
MS breaker — Medium cutting — M Class



- The sharp edges reduces cutting temperatures.
- Reduced contact area on the rake face.
- Suppresses heat generation.

GJ breaker — Semi-heavy cutting — M Class

Ideal for rough turningand machining of surface scale.



- Sharpness and high cutting edge strength with an optimum rake angle and flat land.
- Cutting edge geometry optimized for resistance to face wear when cutting titanium alloy.

RCMX Standard breaker — Medium cutting — M Class — NEW

- A smaller lead angle prevents notching.

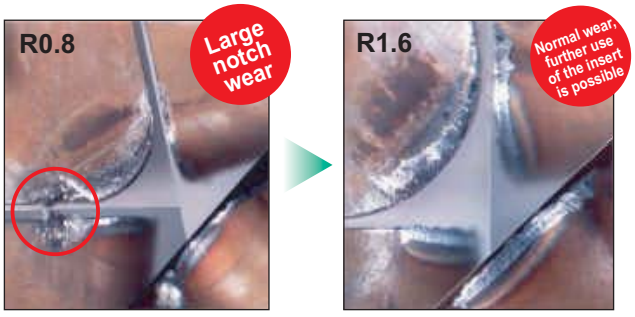
For effective use of large corner radius and round inserts

By setting the depth of cut smaller than the corner radius value, notching during cutting of heat-resistant alloys can be greatly reduced.

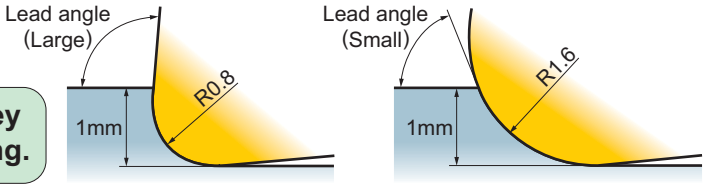
Corner radius>1.5 x Depth of cut

Depth of cut: 1mm
Corner radius over 1.5 is recommended.

<Cutting conditions>
Workpiece : Inconel718
Insert : CNMG1204□□-MJ (US905)
Holder : PCLNL2525M12
Cutting speed : 70m/min
Feed : 0.2mm/rev
Depth of cut : 1.0mm
Coolant : Wet (water soluble)



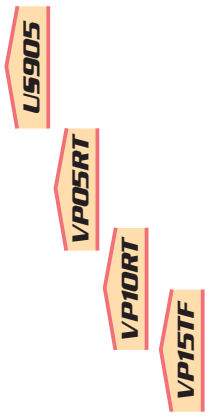
Cutting time : 1min. | Cutting time : 10 min.



A smaller lead angle is the key to reduced notching.

Grade Features

Application range for heat resistant alloy machining

Properties	Heat-resistant alloy
	

CVD coated US905
Unequalled wear resistance enables machining at high speeds when compared to conventional products.

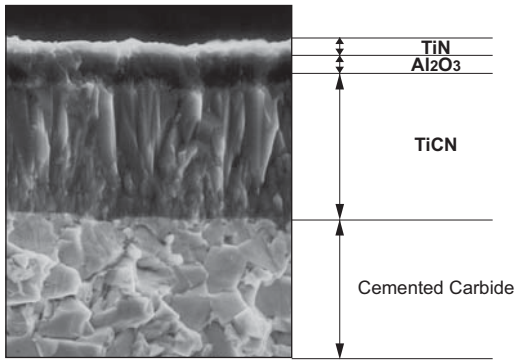
Miracle Coated grade VP05RT
The combination of MIRACLE coating and a high-strength micro-grain cemented carbide substrate increases wear resistance and exhibits high continous cut performance.

Miracle Coated grade VP10RT
A good balance of wear and fracture resistance. First recommendation for turning heat-resistant alloys. Also suitable for stainless steels.

Miracle Coated grade VP15TF
High-strength micro-grain cemented carbide substrate. Ideal for interrupted cutting that requires high fracture resistance.

Features of US905

CVD Coated US905



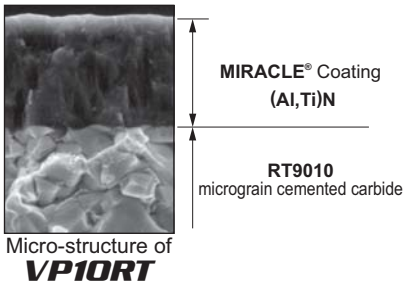
Coating

A CVD coating layer with a close micro structure to prevent flank and face wear of edges that are subject to very high temperatures.

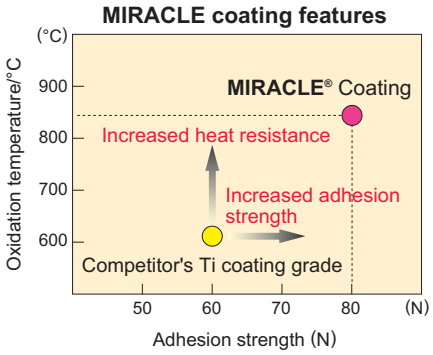
Substrate

The highest hardness cemented carbide substrate suitable for CVD coating. For reduced plastic deformation and improved dimensional accuracy of components.

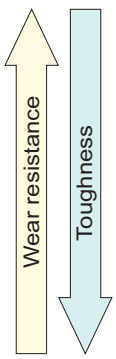
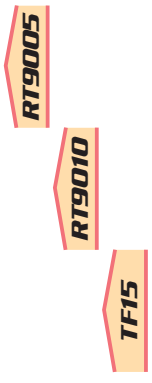
Features of MIRACLE coating



Micro-structure of **VP10RT**



Titanium alloys

Properties	Titanium Alloys
	

Cemented carbide grade RT9005
Unmatched resistance to heat and plastic deformation.
Ideal for wear resistant high-speed machining.

Cemented carbide grade RT9010
Good balance of wear and fracture resistance.
First choice for turning of titanium alloys.

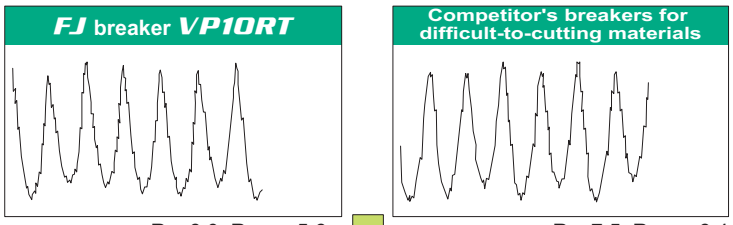
Cemented carbide grade TF15
High-strength micro-grain cemented carbide grade.
Ideal for interrupted cutting that requires high fracture resistance.

FJ/MJ/GJ/MS breaker

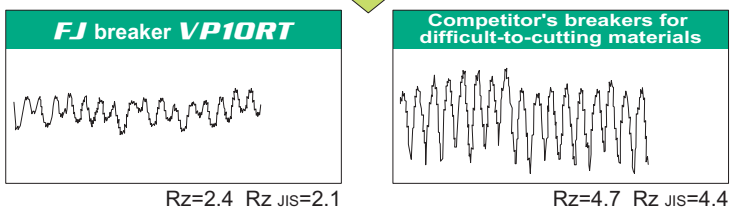
Cutting performance of FJ breaker

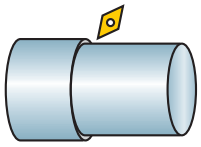
● Finished surface comparison on Inconel 718

Feed 0.15mm/rev



Feed 0.15mm/rev





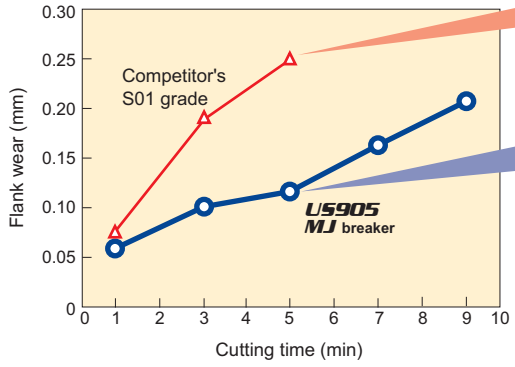
Inconel 718

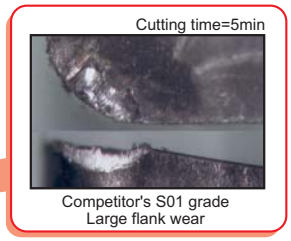
<Cutting conditions>
Insert : DNGG150408-FJ(VP10RT)
Holder : PDJNL2525M15
Cutting speed : 40m/min
Depth of cut : 0.7mm
Coolant : Wet (water soluble)

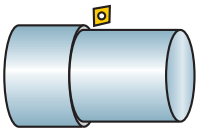
The sharp cutting edges of the FJ breaker for fine feed turning to ensure high quality surface finishes.

Cutting performance of MJ breaker

● High speed turning of Inconel 718
US905 with unmatched wear resistance.







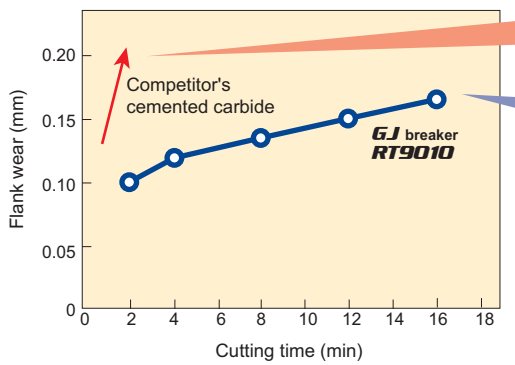
Inconel 718

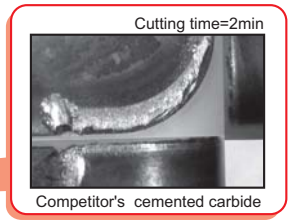
<Cutting conditions>
Insert : CNMG120408-MJ
Holder : PCLNL2525M12
Cutting speed : 90m/min
Feed : 0.15mm/rev
Depth of cut : 0.5mm
Coolant : Wet (water soluble)

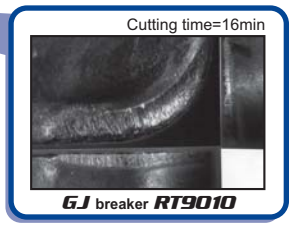
- Unparalleled "sharp" moulded chip breaker cutting edges of class M inserts. For excellent wear resistance due to a combination of M class accuracy and the coated carbide grade US905.
- Excellent for lowly rigidity workpieces and machines.
- Ideal for stainless steel turning with a combination of M class accuracy and the coated carbide grade VP10RT.

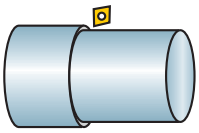
Cutting performance of GJ breaker

● Titanium alloy (Ti-6Al-4V)
GJ breaker for excellent wear & fracture resistance.









Titanium alloy (Ti-6Al-4V)

<Cutting conditions>
Insert : CNMG120408-GJ
Holder : PCLNL2525M12
Cutting speed : 50m/min
Feed : 0.25mm/rev
Depth of cut : 2mm
Coolant : Wet (water soluble)

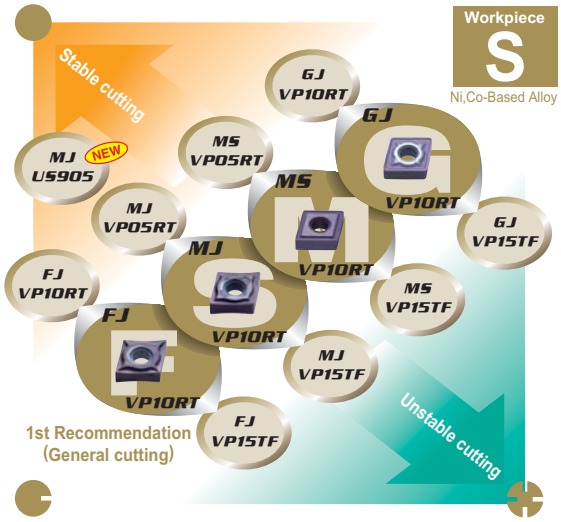
Recommended cutting conditions

Cutting conditions

Stable cutting	Continuous cutting Constant depth of cut machining Pre-machined Securely clamped component machining
General cutting	
Unstable cutting	Heavy interrupted cutting Irregular depth of cut machining Low clamping rigidity machining

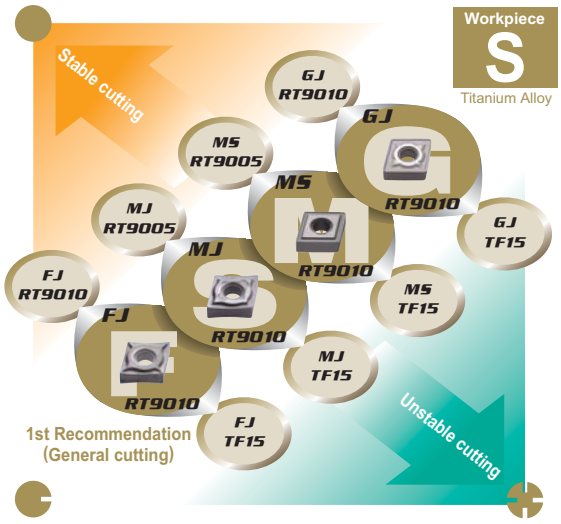
Cutting area

F	Finish cutting
M	Medium cutting
S	Light cutting
G	Semi-heavy cutting



Negative Inserts for Heat-resistant Alloy

Cutting area	Breaker	1st Recommendation grade	Cutting speed (m/min)	Feed (mm/rev)	Depth of cut (mm)
Finish cutting	FJ	VP10RT	20—60	—0.20	—0.8
Finish cutting | Medium cutting	MJ	VP10RT	20—50	—0.20	0.5—1.5
		US905	50—100		
Medium cutting	MS	VP10RT	20—50	0.10—0.25	0.5—2.0
Semi-heavy cutting	GJ	VP10RT	20—40	0.15—0.30	1.0—3.0



Negative Inserts for Titanium Alloy

Cutting area	Breaker	1st Recommendation grade	Cutting speed (m/min)	Feed (mm/rev)	Depth of cut (mm)
Finish cutting	FJ	RT9010	50—100	—0.20	—0.8
Finish cutting | Medium cutting	MJ	RT9010	40—90	—0.20	0.5—1.5
Medium cutting	MS	RT9010	40—80	0.10—0.25	0.5—2.0
Semi-heavy cutting	GJ	RT9010	40—70	0.15—0.30	1.0—3.0

Inserts

Type	Shape	Order Number	Class	Coating				Carbide				Dimensions (mm)				Geometry
				US905	VP05RT	VP10RT	VP15TF	RT9005	RT9010	TF15	HTi10	D1	S1	Re	D2	
FJ (Finish cutting · G Class)		CNGG1204V5-FJ	G			□			□			12.7	4.76	0.05	5.16	
		120401-FJ	G			□			□			12.7	4.76	0.1	5.16	
		120402-FJ	G			□			□			12.7	4.76	0.2	5.16	
		120404-FJ	G			●	●		●	●	□	12.7	4.76	0.4	5.16	
		120408-FJ	G			●	●		●	●	□	12.7	4.76	0.8	5.16	
		DNGG150404-FJ	G			●	●		●	●	□	12.7	4.76	0.4	5.16	
		150408-FJ	G			●	●		●	●	□	12.7	4.76	0.8	5.16	
		VNGG 1604V5-FJ	G			□			□			9.525	4.76	0.05	3.81	
		160401-FJ	G			□			□			9.525	4.76	0.1	3.81	
		160402-FJ	G			□			□			9.525	4.76	0.2	3.81	
		CCGT09T301-FJ	G			□			□			9.525	3.97	0.1	4.4	
		09T302-FJ	G			□			□			9.525	3.97	0.2	4.4	
		09T304-FJ	G			□			□			9.525	3.97	0.4	4.4	
MJ (Finish - Medium cutting · M Class)		CNMG120404-MJ	M	●	●	●		□	□			12.7	4.76	0.4	5.16	
		120408-MJ	M	●	●	●		□	□			12.7	4.76	0.8	5.16	
		120412-MJ	M	●	●	●						12.7	4.76	1.2	5.16	
		120416-MJ	M	●	●	●						12.7	4.76	1.6	5.16	
		DNMG150404-MJ	M	●	●	●		□	□			12.7	4.76	0.4	5.16	
		150408-MJ	M	●	●	●		□	□			12.7	4.76	0.8	5.16	
		150412-MJ	M	●	●	●						12.7	4.76	1.2	5.16	
		150416-MJ	M	●	●	●						12.7	4.76	1.6	5.16	
		150604-MJ	M	●	●	●						12.7	6.35	0.4	5.16	
		150608-MJ	M	●	●	●						12.7	6.35	0.8	5.16	
		150612-MJ	M	●	●	●						12.7	6.35	1.2	5.16	
		150616-MJ	M	●	●	●						12.7	6.35	1.6	5.16	
		TNMG160404-MJ	M	●	●	●		□	□			9.525	4.76	0.4	3.81	
		160408-MJ	M	●	●	●		□	□			9.525	4.76	0.8	3.81	
		160412-MJ	M	●	●	●						9.525	4.76	1.2	3.81	
		VNMG160404-MJ	M	●	●	●		□	□			9.525	4.76	0.4	3.81	
		160408-MJ	M	●	●	●		□	□			9.525	4.76	0.8	3.81	
		160412-MJ	M	●	●	●						9.525	4.76	1.2	3.81	
		WNMG 080408-MJ	M	●	●	●						12.7	4.76	0.8	5.16	
		080412-MJ	M	●	●	●						12.7	4.76	1.2	5.16	
		080416-MJ	M	●	●	●						12.7	4.76	1.6	5.16	
MJ (Finish - Medium cutting · G Class)		CNGG120404-MJ	G			●	●		●	●	□	12.7	4.76	0.4	5.16	
		120408-MJ	G			●	●		●	●	□	12.7	4.76	0.8	5.16	
		DNGM150404-MJ	G			●	●		●	●	□	12.7	4.76	0.4	5.16	
		150408-MJ	G			●	●		●	●	□	12.7	4.76	0.8	5.16	
		VNGM160404-MJ	G			□			□			9.525	4.76	0.4	3.81	
		160408-MJ	G			□			□			9.525	4.76	0.8	3.81	

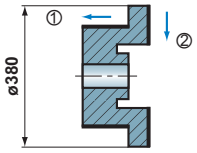
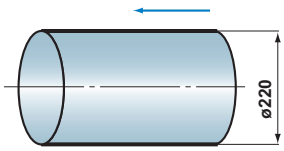
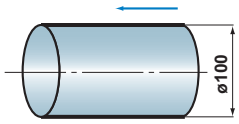
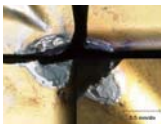
● : Inventory maintained. □ : Non stock, produced to order only.

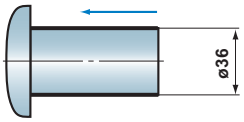
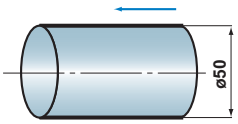
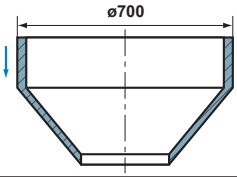
Type	Shape	Order Number	Class	Coating				Carbide				Dimensions (mm)				Geometry
				NEW US905	VP05RT	VP10RT	VP15TF	RT9005	RT9010	TF15	HTi10	D1	S1	Re	D2	
MS (Medium cutting · M Class)		**CNMG120404-MS**	M	●	●	●	●	□	●	●	●	12.7	4.76	0.4	5.16	
		120408-MS	M	●	●	●	●	□	●	●	●	12.7	4.76	0.8	5.16	
		120412-MS	M	●	●	●	●	□	●	●		12.7	4.76	1.2	5.16	
		DNMG150404-MS	M	●	●	●	●	□	●	●		12.7	4.76	0.4	5.16	
		150408-MS	M	●	●	●	●	□	●	●		12.7	4.76	0.8	5.16	
		150412-MS	M	●	●	●	●	□	●	●		12.7	4.76	1.2	5.16	
		NEW **150604-MS**	M	●	●	●						12.7	6.35	0.4	5.16	
		NEW **150608-MS**	M	●	●	●						12.7	6.35	0.8	5.16	
		NEW **150612-MS**	M	●	●	●						12.7	6.35	1.2	5.16	
		SNMG120408-MS	M	●	●	●	●	□	●	□	□	12.7	4.76	0.8	5.16	
		120412-MS	M	●	●	●	●	□	●	□		12.7	4.76	1.2	5.16	
		TNMG160404-MS	M	●	●	●	●	□	●	□		9.525	4.76	0.4	3.81	
		160408-MS	M	●	●	●	●	□	●	□	●	9.525	4.76	0.8	3.81	
		NEW **160412-MS**	M	●	●	●						9.525	4.76	1.2	3.81	
		220408-MS	M	●	●	●	□	□	●	□		12.7	4.76	0.8	5.16	
		VNMG160404-MS	M	●	●	●		□	●			9.525	4.76	0.4	3.81	
		160408-MS	M	●	●	●		□	●			9.525	4.76	0.8	3.81	
		WNMG080408-MS	M	●	●	●	●	□	●	□		12.7	4.76	0.8	5.16	
		NEW **080412-MS**	M	●	●	●						12.7	4.76	1.2	5.16	
GJ (Semi-heavy cutting · M Class)		**CNMG120408-GJ**	M	●		●	●		●	●		12.7	4.76	0.8	5.16	
		120412-GJ	M	●		●	●		●	●		12.7	4.76	1.2	5.16	
		120416-GJ	M	●		●	●		●	●		12.7	4.76	1.6	5.16	
		160612-GJ	M	●		●			□			15.875	6.35	1.2	6.35	
		190612-GJ	M	●		●			□			19.05	6.35	1.2	7.93	
		190616-GJ	M	●		●			□			19.05	6.35	1.6	7.93	
		DNMG150408-GJ	M	●		●	●		●	●		12.7	4.76	0.8	5.16	
		150412-GJ	M	●		●	●		●	●		12.7	4.76	1.2	5.16	
		150416-GJ	M	●		●	●		●	●		12.7	4.76	1.6	5.16	
		150608-GJ	M	●		●						12.7	6.35	0.8	5.16	
		150612-GJ	M	●		●						12.7	6.35	1.2	5.16	
		150616-GJ	M	●		●						12.7	6.35	1.6	5.16	
		WNMG080408-GJ	M	●		●			□			12.7	4.76	0.8	5.16	
		080412-GJ	M	●		●			□			12.7	4.76	1.2	5.16	
		080416-GJ	M	●		□			□			12.7	4.76	1.6	5.16	
		100612-GJ	M			□			□			15.875	6.35	1.2	6.35	
RCMX Insert (Medium cutting M Class)		**RCMX1003M0**	M	●	●	●						10	3.18	—	3.6	
		1204M0	M	●	●	●						12	4.76	—	4.2	
		1606M0	M	●	●	●						16	6.35	—	5.2	

Special Breakers for Difficult-to-cut Materials

FJ/MJ/GJ/MS breaker

Application Examples

Insert (Grade)		CNGG120408-MJ(VP15TF)	CNMG120408-MJ(US905)	DNMG150404-MJ(RT9010)
Workpice		Ring (Inconel 718) 	Inconel 718 (AM5663) 	Titanium alloy (iTi-6Al-4V) 
Cutting conditions	Cutting speed (m/min)	① 50(Continuous) ② 30(Interrupted)	90	70
	Feed (mm/rev)	0.1	0.25	0.2
	Depth of cut (mm)	0.3	0.3	1.0
Coolant		Wet	W.S.O.	Wet
Result		pieces/corner 0 1 Class G **MJ breaker** (VP15TF) Competitor's K20 carbide Fracture Stable machining without fracturing was possible with the MJ breaker.	Class M **MJ breaker** (US905) Cutting length: 1000m  Competitor's S01 coating Cutting length: 680m 	Cutting time (min) 0 2 5 Class M **MJ breaker** (RT9010) Competitor's K10 carbide (G Class) Doubled tool life with the MJ breaker.

Insert (Grade)		CNMG120408-GJ(VP10RT)	TNMG160408-MJ(VP05RT)	RCMX1204M0(VP05RT)
Workpice		Pin (Inconel 718) 	Sintered iron components (FH655) 	Case (Inconel 718) 
Cutting conditions	Cutting speed (m/min)	31	120	45
	Feed (mm/rev)	0.2	0.05	0.2
	Depth of cut (mm)	2.3	0.5	0.8
Coolant		W.S.O.	Wet	Wet
Result		pieces/corner 0 1 2 **GJ breaker** (VP10RT) Competitor's coated carbide GJ beaker for excellent chip disposal and vastly increased tool life.	pieces/corner 0 75 150 300 Class M **MJ breaker** (VP05RT) Competitor's K10 carbide (G Class) 50% longer tool life.	Standard breaker **RCMX insert** (VP05RT) Cutting time:11min  Competitor's S01 coating Cutting time:9min  Normal wear, further use of the insert is possible.

For Your Safety
●Don't handle inserts and chips without gloves. ●Please machine within the recommended application range and exchange expired tools with new ones in advance of breakage. ●Please use safety covers and wear safety glasses. ●When using compounded cutting oils, please take fire precautions. ●When attaching inserts or spare parts, please use only the correct wrench or spanner.

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(Tools specifications subject to change without notice.)

2008.12.E(-)